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ABSTRACT

A bilingual education program in two New York City elementary schools is evaluated. The program served 369 students, most of them limited-English-proficient native Spanish-speakers, providing supplementary instructional services in English as a Second Language (ESL), native language arts, and mathematics in the context of architecture. The report summarizes the program's staffing, specific behavioral objectives and results in those content areas, attendance and persistence patterns, student grade retention, services for students with special needs, mainstreaming, staff development, curriculum development, and parental involvement, and includes one brief case study. Notes on methods of data collection and analysis for the evaluation and a list of instructional materials used are appended. (MSE)

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OREA Report

Bilingual Education Through Architectural Mathematics
(Project BEAM)
Community School District 7
Transitional Bilingual Education Grant T003A90275
1991-92

FINAL EVALUATION PROFILE

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FOREWORD

The body of this report is preceded by an Extract which presents an overview of salient points of the project: funding cycle; enrollment figures; background of students served; admission criteria; and programming features, strengths, and limitations, including the outcome of all objectives. The extract also presents the conclusions drawn by the Office of Research, Evaluation, and Assessment (OREA) about the program and its recommendations for program improvement.

The extract is followed by the body of the report, titled Program Assessment. This includes such information as staffing, program implementation, and outcome and implementation objectives. Instructional objectives are presented first, followed by noninstructional objectives. The report then addresses those aspects of programming mandated by Title VII regulations that do not have specifically stated objectives. This may be information on attendance and dropout rate, grade retention, mainstreaming, referrals out of the program to meet special needs of the students, and withdrawals. A case history concludes the report.

Data for this profile were collected and analyzed using a variety of procedures, which are described in Appendix A following the text.

Office of Research, Evaluation, and Assessment
New York City Public Schools

E.S.E.A. Title VII Evaluation Profile

Bilingual Education Through Architectural Mathematics (Project BEAM)

Community School District 7 Bronx
Transitional Bilingual Education Grant T003A90275
1991-92

EXTRACT

PROJECT DIRECTOR: Ms. Yvette Boronow FUNDING CYCLE: Year 3 of 3

SITES

School	Grade Levels	Enrollment*
P.S. 49X	2-5	169
P.S. 156X	1-5	200

*The project enrolled 369 students (121 more than in the previous year). Male students numbered 160, female students 169; gender was not stated for 40.

STUDENT BACKGROUND

Native Language	Number of Students
Spanish	340
English	29

Countries of Origin	Number of Students
United States	184
Dominican Republic	66
Puerto Rico	57
Mexico	29
Honduras	9
Ecuador	6
Guatemala	5
El Salvador	3
Other	4
Unreported	6

Median Years of Education in Native Country: 2.0; in the United States: 3.0

Percentage of Students Eligible for Free Lunch Program: 68.3

ADMISSION CRITERIA

The project admitted students who scored at or below the 40th percentile on the Language Assessment Battery (LAB) and were thus designated as being of limited English proficiency (LEP). A number of English proficient (EP) students who would profit from the program were also admitted.

PROGRAMMING

Design Features

Project BEAM was designed to provide supplementary instructional services to limited English proficient (LEP) students. Using architecture as a setting for instruction, the project was to offer courses in English as a Second Language (E.S.L.), Native Language Arts (N.L.A.), and mathematics. Parental participation and staff development were designed to be an integral part of this project.

Capacity building. Title VII funding was renewed for two years, starting next year. When this renewal of funding runs out, C.S.D. 7, which has been contributing continuously to the funding of the project, is planning to take it over.

Strengths and Limitations

Project BEAM carried out those activities it had proposed in its design. The project director reported that the architectural focus and students' creation of model bridges, houses, and other structures developed greater self-awareness and self-esteem in participants.

CONCLUSIONS AND RECOMMENDATIONS

Project BEAM was fully implemented. It met its objectives for E.S.L., curriculum development, and parental involvement. Contrary to last year, the project did not meet its objective for N.L.A. this year. The project met its objective for demonstrating knowledge and appreciation of architecture, but not the objective for the content area subject of mathematics. Project BEAM met its staff development objectives for instructional use of architecture and staff participation in workshops and conferences, but failed to meet the staff development objective for enrollment in university courses. The project came close, but did not meet, its attendance objective.

The conclusions, based on the findings of this evaluation, lead to the following recommendations:

- Explore ways of increasing N.L.A. skills.
- Augment instruction in mathematics, possibly through peer tutoring, individualized instruction, and/or an after-school tutorial program.
- Encourage program teachers to enroll in university courses.
- Involve resource teachers in working with groups of students on the importance of good attendance.

PROGRAM ASSESSMENT

STAFFING

Title VII Staff (Total 3)

Title	Degree	Language Competencies	Title VII Funding	Other Funding
Project Director	M.A., P.D.	Spanish	Part-time	C.S.D. 7
Resource Teacher	B.A.	Spanish	Full time	
Resource Teacher	M.A.	Spanish	Full time	

Other Staff Working With Project Students (Total 12)

Title		Degree		Certification		Language Competencies and Teaching/ Communicative Proficiencies (TP/CP)*		
Teachers	12	M.A.	12	Bil. Common Branches	12	Spanish	TP	12

All staff had certification in areas they served.

IMPLEMENTATION AND OUTCOMES (objectives prefaced by •)

Project BEAM's resource teachers and a licensed architect contracted by Learning through an Expanded Arts Program (LEAP) provided participating students with instruction in English, Spanish, mathematics and architecture. Resource teachers coordinated topics with non-project classroom teachers to insure congruence. The resource center was also open to visits from other classes.

English as a Second Language (E.S.L.)

Project students received five periods of E.S.L. instruction each week. Participating students, with their classroom teacher, attended the Project BEAM resource center, where they were assisted by a bilingual project resource teacher. Lessons were based on levels of proficiency. Instructional strategies included peer tutoring, dramatization, grouping, and cooperative learning. For a list of instructional materials see Appendix B.

- As a result of participating in the program, students will demonstrate achievement beyond expectation in English as a Second Language ($p<.05$) in the N.C.E.s as measured by the English version of the Language Assessment Battery (LAB).

Evaluation Instrument: Language Assessment Battery (LAB)**

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*Teaching Proficiency (TP): Competent to teach in this language.
Communicative Proficiency (CP): Conversational capability only.

**OREA used a gap reduction design to evaluate the effect of supplementary instruction on project students' performance on the LAB. Since all LEP students in New York City are entitled to such instruction, no valid comparison group exists among these students, and OREA used instead the group on which the LAB was normed. Test scores are reported in Normal Curve Equivalents (N.C.E.s), which are normalized standard scores with a mean of 50 and a standard deviation of 21.06. It is assumed that the norm group has a zero gain in N.C.E.s in the absence of supplementary instruction and that participating students' gains are attributable to project services.

Pretest: May 1991; posttest: May 1992.

Number of students for whom pre- and posttest data were reported: 262

Mean gain: 6.1 N.C.E.s (s.d.=16.6)

Mean gain is statistically significant (t=5.94, p<.05).

Project met E.S.L. objective.

Native Language Arts (N.L.A.)

Estimated percentage of students lacking literacy skills in native language: less than 1 percent.

Participating students received five periods of N.L.A. instruction weekly. Some instructional methods included peer tutoring and cooperative learning. By taking notes and reading (silently and aloud), students developed listening comprehension and fluency in their native language. For a list of instructional materials see Appendix B.

- As a result of participating in the program, students will demonstrate achievement beyond expectation (p<.05) in N.C.E.s as measured by the Spanish version of the Language Assessment Battery (LAB).

Evaluation Instrument: Pretest, Reading Subtest of Spanish LAB, May 1991; posttest, Examen de Lectura en Español (ELE), May 1992.*

Pretest: May 1991; posttest: May 1992.

Number of students for whom pre- and posttest data were reported: 71

Mean gain: -6.6 N.C.E.s (s.d.=20.4)

Mean gain is statistically significant (t=-2.75, p<.05)

Project did not meet N.L.A. objective. The project director stated that there would be more reading periods in the next program year.

Content Area Subjects

Project BEAM students were enrolled in courses in mathematics (including architecture), science, and social studies. The project proposed objectives for mathematics only.

Project BEAM exposed students to mathematical concepts by providing them with hands-on activities in a stimulating learning environment focusing on architecture. In early grades, topics introduced included measuring the height of people; using scale numbers; and making and using tape measures. In later grades, topics included solving word problems and dimensions and formulas for areas and volumes.

Students had five periods of instruction in architectural mathematics weekly. For a list of instructional materials see Appendix B.

- As a result of participating in the program, students will demonstrate achievement beyond expectation (p<.05) in N.C.E.s as measured by the New York City Mathematics Test for program evaluation.

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*Details for the evaluation design using the spring 1991 Spanish LAB administration as a pretest and the spring 1992 ELE administration as a posttest will be forthcoming.

Evaluation Instrument: Metropolitan Achievement Test in Mathematics (MAT-Math)

Pretest: April 1991; posttest: April 1992.

Number of students for whom pre- and posttest data were reported: 199

Mean gain: -4.5 N.C.E.s (s.d.=14.9)

Mean gain is statistically significant (t=-4.27, p<.05).

Project did not meet mathematics objective. The project director reported that more staff development in mathematics instruction would be offered and she anticipated improvement in the next program year.

- As a result of participating in the program, 80 percent of the students will demonstrate knowledge and appreciation of various architectural techniques.

Evaluation Indicator: teacher judgment.

Number of students for whom data were reported: 247

Percentage of students who showed progress: 93.5

Project met objective for demonstrating knowledge and appreciation of architecture.

Attendance

- As a result of participating in the program, there will be a significant gain in student attendance.

ATTENDANCE RATES

School	1991-92	1990-91	Difference
P.S. 49	92.5	90.9	1.6
P.S. 156	95.0	94.1	0.9

Although students' attendance increased, the gains were not statistically significant.

Project did not meet attendance objective. The project director stated that the project would offer more parental workshops on the importance of attendance, in the hope of influencing students.

Dropout Prevention

As in the previous year, no project students dropped out. The project did not propose any objectives for dropout prevention.

Grade Retention

Eight students were retained in grade. This represented a 50 percent decrease from the previous year. No objective was proposed for reducing grade retention.

Students With Special Academic Needs

Referral to special education. Three students were referred to special education. In accordance with New York City Public Schools guidelines, Project BEAM staff followed the procedures established by C.S.D. 7 for referring students to special education. The School-based Support Team (S.B.S.T.) evaluated students before placement. At P.S. 156, one S.B.S.T. member spoke the language of the students being evaluated. None of the S.B.S.T. members spoke the students' language at P.S. 49. The resource teacher at this school, however, served as an interpreter for Spanish-speaking students.

Remedial programs. Twelve students were referred to remedial programs. OREA did not have figures for the previous year.

Gifted and talented programs. No students were referred to gifted and talented programs. OREA did not have figures for the previous year.

Mainstreaming

One student (0.3 percent of participants) was mainstreamed. OREA did not have mainstreaming figures for the previous year.

Staff Development

- Participating teachers will demonstrate a greater ability to use various forms of architecture in their E.S.L. and Spanish reading instruction.

As a result of coordinating lessons with the resource teachers and attending field trips, participating teachers were better able to use architectural concepts to stimulate students' interest and further develop their English and Spanish reading, writing, and listening skills.

Project met objective for staff development in instructional use of architecture.

- Sixty percent of program teachers will have enrolled in at least one university course each semester.

Tuition reimbursement was provided for all participating teachers who requested it. The project director reported that only 30 percent of the teachers enrolled in university courses, since most already had a master's degree.

Project did not meet objective for enrollment in university courses. The project director will emphasize the importance of this staff development objective in the next program year.

- Sixty percent of program teachers will have participated in teacher training workshops and conferences.

All Project BEAM teachers participated in districtwide staff development conferences and a number of on-site Project BEAM workshops. In addition, the project director sent informal letters to disseminate information to teachers about materials, activities, curricula, etcetera.

Project met objective for staff participation in workshops and conferences.

Curriculum Development

- A draft of a manual containing learning activities and methods to be used for E.S.L./Spanish reading will be prepared by the participating staff and teachers.

Project staff and teachers drafted a curriculum guide for E.S.L./Spanish reading lessons based on architectural concepts.

Project met curriculum development objective.

Parental Involvement

- Sixty percent of the parents of participating students will have participated in program-related activities.

Project BEAM provided workshops, meetings, field trips, and an art exhibit for the parents of participating students. Project attendance records indicated that over 60 percent of the parents participated.

Project met objective for parental involvement in program-related activities.

- Sixty percent of the parents of participating students will have participated in E.S.L. and Spanish Reading through Architectural Mathematics activities.

Project records showed that over 60 percent of the parents participated in E.S.L. and Spanish reading through architectural mathematics activities.

Project met objective for parental involvement in E.S.L. and Spanish reading activities.

CASE HISTORY

D.C. of P.S. 49 was a shy and timid child. In the school since kindergarten, he was now in the fourth grade. In the past, D.C. was usually reluctant to perform tasks without prior approval. The program has helped him to follow directions, and he has shown a willingness to participate more often. He is also more communicative, and his mathematics and reading scores in both English and Spanish have improved.

APPENDIX A

DATA COLLECTION AND ANALYSIS

COLLECTION

OREA evaluation consultants visit sites and interview key personnel. The project director gathers data and, with the consultant, completes forms (as shown below) as necessary.

Student Data Form

This one-page form is filled out by staff for each participating and mainstreamed student. OREA gathers data from this form on backgrounds, demographics, academic outcomes, attendance, referrals, and exit from the program.

Project Director's Questionnaire

The Project Director's Questionnaire includes questions on staff qualifications, program implementation, periods of instruction, and instructional materials and techniques.

Project Director's Interview

The interview gathers information on program and student or staff characteristics not supplied by the Project Director's Questionnaire. The interview also allows project staff to offer qualitative data or amplify responses to the questionnaire.

Citywide Test Scores

OREA retrieves scores centrally from the Language Assessment Battery (LAB) and other citywide tests. For evaluation purposes, these test scores are reported in Normal Curve Equivalents (N.C.E.s). N.C.E.s are normalized standard scores with a mean of 50 and a standard deviation (s.d.) of 21.06. They constitute an equal-interval scale in which the distance is the same between any two adjacent scores. A gain of 5 N.C.E.s is the same whether it is at the lower or the higher end of the scale. N.C.E.s can be used in arithmetic computations to indicate group progress. (Percentile scales, although more familiar to many, are unsuitable for such computations since they are not equal-interval.)

Likert-Type Surveys

Likert-type surveys, in which respondents mark their opinions on a scale from one to five, are used in a variety of ways. They examine student attitudes (i.e., toward school and career, native language use, and native and mainstream cultures). They also assess staff and parent attitude and reactions to workshops and other activities.

ANALYSIS

Gap Reduction Evaluation Design

OREA uses a gap reduction design for measuring changes in standardized tests. Since no appropriate non-project comparison group is available in New York City, where all students of limited English proficiency (LEP) are entitled to receive supplementary services, OREA compares the progress of participating students with that of the group on which the test was normed. It is assumed that the norm group would show a zero gain in the absence of instruction, and gains made by project students could be attributed to project services. Scores are reported in Normal Curve Equivalents (N.C.E.s), which are normalized standard scores with a mean of 50 and a standard deviation of 21.06. (See "Citywide Test Scores" above.)

To test whether pre/posttest gains are greater than could be expected by chance alone, OREA uses a *t*-test. To test whether a difference between two proportions (e.g., program and mainstream attendance rates) is

greater than could be expected by chance, OREA uses a *z*-test and reports the differences between the two proportions. The level of significance is set at .05 for all tests.

Techniques For Minimizing Error

The evaluation procedures minimize error by providing for proper administration of evaluation instruments through a combination of testing at 12-month intervals, appropriate analysis procedures and reporting.

Instruments of measurement include the LAB (see above), the Degrees of Reading Power (D.R.P.) test, the Metropolitan Achievement Test--Mathematics (MAT-Math), El Examen de Lectura en Español (ELE), Likert-type scales (see above), and project-developed tests. Except for Likert scales and project-developed tests, these instruments are scored on a citywide basis at the Scan Center of the New York City Public Schools.

APPENDIX B

INSTRUCTIONAL MATERIALS

E.S.L.

BEAM Curriculum Guide	Project BEAM	C.S.D. 7
E.S.L. Activity Kit	E. Claire	Prentice Hall
Open the Light	Coreen Carruthers	Addison Wesley
Architecture series	D. MacCauly	Houghton Mifflin
Where the Wild Things Are	Maurice Sendak	Harper & Row
Complete ESL/EFL Resource Book		National Textbooks

N.L.A.

BEAM Curriculum Guide	Project BEAM	C.S.D. 7
Campanitas de oro	Spanish Big Books	Lectorum Publishing Co.
Mil maravillas	Spanish Reading Series	MacMillan Publishing Co.
Individual Reader		Modern Curriculum Press

Content Area Subjects

BEAM Manuals	Project BEAM	C.S.D. 7
Mathematics		Holt, Rinehart & Winston
Ciencias		Silver Burdett
Ciencias		Holt, Rinehart & Winston
Geografía de ayer y hoy		Silver Burdett